A Summary of Juvenile Salmon Research along the Eastern Bering Sea Shelf by the Ocean Carrying Capacity Program, August–October (2001–2005)

Edward V. Farley, Jr., James M. Murphy, Lisa Eisner, and John H. Helle

Auke Bay Laboratory, Alaska Fisheries Science Center; NMFS, NOAA, Department of Commerce, 11305 Glacier Highway, Juneau, AK 99801, USA

Keywords: Juvenile salmon, distribution, feeding, eastern Bering Sea

Mechanisms affecting marine survival of eastern Bering Sea salmon stocks are poorly understood due to the lack of basic biological information about the early marine life history of salmon in this region. Earlier studies of juvenile salmon migration in the eastern Bering Sea were generally focused within Bristol Bay (Straty 1974; Hartt and Dell 1986; Isakson et al. 1986). Information on juvenile salmon in the Arctic, Yukon, and Kuskokwim region is limited to a 1986 study of juvenile salmon that was restricted to a few sample stations around the Yukon River delta (Martin et al. 1986). Summaries of these studies can be found in Brodeur et al. (2003).

During the past five years (2001–2005), the Auke Bay Laboratory’s Ocean Carrying Capacity program has conducted surveys of juvenile salmon along the eastern Bering Sea shelf. The goal of the Ocean Carrying Capacity program’s juvenile salmon research along the eastern Bering Sea shelf is to understand mechanisms underlying the effects of environment on the distribution, migration, and growth of juvenile salmon in the eastern Bering Sea. Primary objectives of this work are: 1) determine the extent of offshore migrations of juvenile salmon from rivers draining into the eastern Bering Sea, 2) describe the physical environment of the eastern and northeastern Bering Sea shelf waters occupied by juvenile salmon, and 3) collect biological information on other ecologically important species. Summaries of the juvenile salmon surveys are reported in Farley et al. (2001, 2003, 2004, 2005).

In general, distributions of juvenile salmon along the eastern Bering Sea shelf vary between species. During our five year study, juvenile pink salmon were distributed further offshore during even years (Fig. 1a) and offshore and nearshore locations during odd years (Fig. 1b). The presence of juvenile pink salmon nearshore during odd years is likely due to dominance of the even year pink salmon returning to western Alaska. Juvenile chum, coho, and chinook salmon were generally distributed nearshore along coastal regions off the Yukon and Kuskokwim Rivers (Figs. 1c–e).

Fig. 1. Selected examples of distribution of juvenile salmon, described by the logarithm of catch per unit effort (number of juvenile salmon caught during a 30 minute trawl haul), for juvenile pink salmon during 2002 (a) and 2003 (b), juvenile chum (c), coho (d), chinook (e), and sockeye (f) salmon collected during August–October 2002 along the eastern Bering Sea shelf.
Juvenile sockeye salmon were generally distributed in offshore locations of the eastern Bering Sea shelf (Fig. 1f).

The relative abundance (the average of the catch per unit effort; catch of juvenile salmon during a 30-minute trawl haul) varied between years and species (Table 1). The relative abundance of juvenile pink, coho, and chinook salmon was highest during 2003. The relative abundance of juvenile chum salmon was highest during 2002 and 2003, and then declined during 2004. The relative abundance of juvenile sockeye salmon increased each year, declined during 2004, then greatly increased during 2005. Although it is too early to detect, the variability in juvenile salmon relative abundance during the last five years appears to be positively related to adult returns to western Alaska.

Other data collected during the survey indicate that fish, including age-0 pollock (*Theragra chalcogramma*), sand lance (*Ammodytes hexapterus*), and capelin (*Mallotus villosus*) dominated the diets of juvenile salmon along the eastern Bering Sea shelf during fall (Fig. 2). In addition, depth-averaged sea temperatures from a conductivity-temperature and depth device deployed at each fish station during our surveys have indicated that the temperature along the eastern Bering Sea shelf has increased during the five year period, especially in the nearshore areas.

### REFERENCES


